

Instructions for Construction of CR Tri-composite Carriage – 1869

Based on Metro-Cammell Drawing No 2288

Chassis

1. Remove main chassis from fret, file off all tags and bend as follows:
 - a. Bend down chassis sides
 - b. Bend out individual footsteps
 - c. Reinforce chassis and footstep bends with solder if required.
 - d. Tin chassis sides

2. Prepare solebar overlays as follows:
 - a. File off all tags.
 - b. Emboss all the rivets from the rear, not forgetting those on the straps at the bottom of the U-irons. These straps can then be bent over.
 - c. Tin back of solebar overlays
 - d. Complete the diagonal straps running from the bottom of the outer U-irons to the solebar at each end of the chassis by soldering 0.7mm brass wire to the back of diagonal straps on the etch and long enough to reach the buffer beam behind the solebar. The straps are only partially represented on the etch due to its design. Leave some excess wire at the buffer beam end to trim off later. (Do not solder to solebar overlay, as these wires must fit behind the solebars when chassis is assembled.)
 - e. Make the slot for the middle footstep a bit deeper and file this footstep, if necessary, to ensure the solebar overlay fits centrally both horizontally and vertically on the chassis side.

3. For 7mm scale assemble the solebar overlays to the chassis sides using your Resistance Soldering Unit. You will not be able to get this amount of brass hot enough with a normal soldering iron.. For 4mm you can probably use a soldering iron but the RSU is a better option here as well. Hold the overlays in place with some hairclips and work outwards from the middle in each direction. When all is fixed, solder the diagonal straps to the rear of the solebar and trim off any excess.

- 4.. The etch includes provision for building a flexible chassis that will help 3 axles travel smoothly round sharp model curves. This works by using pivoting cradles for the outer axles joined to a centre cradle that has with lateral movement only. The cradles are connected with wires to transmit and control their movement. To achieve a true Cleminson-style action some vertical movement is also required. I used and adapted the etched parts as follows:
 - a. Cut out all three cradles and remove all tags.
 - b. Fold up brake shoes on outer axle cradles and solder together. Re-drill the holes for the triangular brake-gear rods if necessary.
 - c. Fold up cradles and reinforce bends with solder if required.
 - d. Open up the pivot holes in the outer axle cradles to 8 BB clear.
 - e. The centre axle cradle slides between two guides running across the centre of the carriage floor. Unfortunately the fold-down guides etched in the carriage floor are too close together when bent down for the cradle to slide freely between them. I replaced these guides with two sections of 4mm x 4mm brass L angle 30 mm long. Remember to remove a section in each piece of angle for the wires running between the cradles.
 - f. Drill two holes in the carriage floor for the pivots for the outer axle cradles. These are not on the etch and need to be on the centre line 21mm (for 7mm scale and I suppose 12mm for 4mm) inboard from the centre of the hole that is included on the etch and marks the axle centre line.

- g. For true Cleminson action I soldered lengths of half-round brass wire on top the outer cradles. On one cradle this is lateral (i.e. in line with the axle) and on the other longitudinal (i.e. at right angles to the axle).
 - h. Attach the cradles to the floor with 8 BA screws using 8 BA washers between the cradle and the floor.
 - i. Cut a length of 0.9mm (or 0.5 mm spring steel wire for 4mm) nickel silver long enough to pass through the 2 holes on one outer axle cradle and the corresponding hole in the centre cradle. Cut a second length of wire for the second outer axle cradle and fit this though the other hole in the centre cradle. The two wires should nearly meet but not touch somewhere near the middle of the centre cradle.
 - j. Solder the wires in position to the outer cradles only. This is best done by tack joints at this stage. Remove the cradles from the chassis and solder the wires firmly in position on the outer cradles.
 - k. Fit the triangular brake operating rods, axle bearings and wheels. The brake rods with the "adjuster" go at the outer ends of the carriage with the adjuster positioned under the axle. The other rods are set to go over the axle.
 - l. Fit the wheels. For 7mm Slater's wheels you will have to shorten the small part of the axle to leave 3.5 mm at each end for mounting the wheels. Ream the bearings a little, if necessary, until the axles run freely in the bearings.
5.
 - a. Clean up the castings for the axleboxes, springs and spring hangers.
 - b. Tin the front of the U-irons for the axleboxes, the inside faces for the springs and the rear of the solebar for the spring hangers with 179 or 188 solder.
 - e. Solder the axleboxes by applying a cool soldering iron charged with low temperature (70°) solder. This should flow round the axlebox to fix it to the U-iron
 - f. Mark the centre of the spring hanger castings to aid positioning on the solebar. Solder these to the rear of the solebar using low melt solder. Some filing may be necessary on the castings at the outer ends of the solebar to fit round the extra U-iron stays you fitted earlier.
 - g. Solder the springs to the spring hangers with a cool iron at 100° charged with low temperature solder. This is a lot easier and less frightening to do than it sounds if you do it quickly. I used Powerflux for this job to ensure it worked first time.
 6.
 - a. Clean up the buffer beam castings.
 - b. Tin the underside of the chassis in the area where the inside edge of the castings comes.
 - c. It is impossible to solder the whole of the buffer beam castings to the chassis but an adequate bond can be achieved by soldering along the inside edge of the casting and into the holes in the castings using low temperature solder and Powerflux..
 7. Remove tags and clean up the lower footboards. I spent some time filing out the etched fold-lines with triangular and then square needle files to deepen them. This makes folding up a lot easier and it is a simple matter to reinforce the folds with solder after folding.
 8. The 2 outer footboard hangers on each side are included on the etch but the 3 other footboard hangers on each side of the underframe are missing. Bend to shape the ones that are there and solder the footboards to them. This will give you the spacing to make the other hangers.
 9. The other hangers are located in line with the centres of 3 of the small footsteps on the solebar. You will have to bend these hangers from 0.7mm brass wire for 7mm. I made up U-shaped pieces in a bending jig (piece of scrap brass from the etch with 2 holes at the correct spacing) and soldered one leg to the underside of the small footsteps and the other under the lower footboard.
 10. Fit the buffers with packing from brass strip as the holes in the buffer beam are a bit too big. I fixed mine with superglue.

11. Make up the safety chains, which should have seven links for the hook to lie in line with the rails. Drill the buffer beams with a 1mm drill, make up loops of 15 amp fuse wire and solder into holes on the back face of the buffer beam ensuring the chains hang freely.
12. The final job is to solder the 4 lamp irons, two to each buffer beam.

Body

1. Separate the sides and ends from the etch. Carefully remove the waist panels but keep together in a safe place. Cut off all tags and clean up the edges.
2. Add the droplights while the sides are still flat. There are different sizes for 1st and other class compartments. I used masking tape to hold the droplights in place and soldered them using solder paint and the RSU.
3. Now form the tumblehomes in the sides. I support the top of the carriage side on a bevel-edge ruler and used a length of copper central heating pipe to form the tumblehome. Use an end to check progress.
4. Add the waist panels making sure that you have these in the correct spaces and with the cut-outs for the commode handles at the left-hand of the appropriate panels. I used solder paint and RSU for this job. Make sure that the panels are properly in position before soldering. I finished up with one that was not quite right and it proved very difficult to remove and reposition it..
5. Bend the top folds on the sides to the profile of the roof using an end as a guide.
6. Bend the bottom folds using an end to get the angle correct.
7. Cut out the two ends, which on this vehicle are flat.
8. To ensure you build the body correctly solder the end with footsteps to one carriage side at the end with 2 third class compartments. Soldering the ends and sides together should be easy if you have formed the tumblehome correctly. Tack solder until you are happy with the position and final solder with a generous fillet of solder to give strength to the joint.
9. Solder the other side and end and then join the two half-bodies to form the complete shell. Check that the compartments line up with the oil lamp positions on the roof before proceeding to the detailing.
10. Separate the lower door hinges from the fret one at a time, bend and solder in place with solder paint.
11. Remove the oval-shaped door handles from the fret leaving as much tag as you can. Bend the tags at right angles to the handle and solder into the holes provided using a thin card spacer to create a space between the handle and carriage side. I used solder applied with a hot iron on the inside of the carriage to fix these and fill the holes in the body side.
12. Remove the commode handles. Again leaving as much tag as possible. Solder these into the holes in the body as for the door handles. The door handles do fit inside the commode handles
13. Remove the end steps from the fret, form the rivet heads and fold up. Solder the ends steps to the end with the appropriate marks. This is best done with solder paint and your RSU. Two end steps

are provided that should be fixed the buffer beam. Forget this and solder the rear faces of these steps to the carriage end in the correct position.

14. Shape the handrails from 0.7mm brass wire for 7mm and solder into holes in the footstep end.
15. Find the 2 lamp irons on the fret cut out and bend to shape. Solder to the body sides in the correct place at the left hand end of each side. The RSU is the tool for this job.
16. Buy or borrow a rolling mill to shape the roof. It is possible to do this by hand with a length of copper pipe and pile of magazines but I would recommend the former method for ease of performance and mind.
17. A set of cast brass posts is provided for the roof luggage rack. This is worth doing properly as it is the first part of your carriage most people will see. This means that the 4 corner posts need to be drilled to take the ends of the lateral rails. This requires a bit of perseverance but there are enough spares to tolerate some failures.
 - a. For the corner posts make a very small 'centre' with a sharp scribe, use a 0.5mm drill to open out a hole and then finish with a 0.7mm drill.
 - b. Drill out the holes in the roof to 1.3 mm. Some of the posts are a tight fit and some a bit looser with this size for the holes.
 - c. Make up the posts and rail for one side using 0.7mm brass wire..
 - d. Solder the middle three posts making sure they are in line, then solder the end posts
 - e. Do the other side rail and posts.
 - f. Fit the lateral rails by trial and filing until the ends fit neatly in the holes you spent a lot of time drilling.
 - g. A touch of flux and solder on the corner post will fix the rails neatly in position.
18. Fit the step end handrails by soldering from the underside of the roof.
19. Fit the oil lamp housings. These can be soldered with low temperature solder or glued.
20. Check the fit of the rook to the body. Holes are provided for the stems of the roof rack supports but these will need to be enlarged with a round needle file to give a good fit.
21. The last job is drill the holes on the body and underframe for screws to join the 2 bits of your carriage. Although holes are designed into the etch these do not match up and some work may be necessary. I soldered 8 BA nuts to the body etch and then found I had to enlarge the holes in the underframe, including the buffer beam castings, to align 8 BA screws to these..